MULTIMEDIA UNIVERSITY

STUDENT ID NO

MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 2, 2017/2018

BEC2054 –ECONOMETRICS 2

(All sections / Groups)

16 MARCH 2018
9.00 a.m. - 11.00 a.m.
(2 Hours)

INSTRUCTIONS TO STUDENTS

1. This question paper consists of **SIX (6) pages** excluding cover page with **FOUR (4) questions**, formula and statistical tables.
2. Attempt **ALL** questions. The distribution of the marks for each question is given.
3. Write all your answers in the answer booklet provided.
4. Formulas and statistical tables are attached.

QUESTION 1

(a) What do you understand by the term "identification"? Describe the *order condition of identification* in a model of M simultaneous equations. (7 marks)

(b) Consider the following demand-and-supply model for money:

$$\text{Demand for money: } M_t^d = \beta_0 + \beta_1 Y_t + \beta_2 R_t + \beta_3 P_t + \beta_4 Y_{t-1} + \mu_{1t}$$
$$\text{Supply of money: } M_t^s = \alpha_0 + \alpha_1 Y_t + \mu_{2t}$$

where M = money
Y = income
R = interest rate
P = price

Assume that R, P and Y_{t-1} are predetermined and, M and Y are endogenous.

(i) By the *order condition*, is the demand function identified? (3 marks)

(ii) By the *order condition*, is the supply function identified? (3 marks)

(iii) Which method would you use to estimate the parameters of the identified equation(s)? Explain. (4 marks)

(iv) Suppose you modify the supply function by adding the explanatory variable M_{t-1}. What happens to the identification problem for the demand and supply functions? Would you still use the method you used in (iii)? Explain. (8 marks)

[Total: 25 marks]

Continued...

QUESTION 2

(a) Distinguish between dynamic model and distributed-lag model. (6 marks)

(b) The Eviews output below exhibits the Koyck model, examining relationship between consumption expenditure (CONS) and disposable income (DI) for Country XYZ for the period 1969 – 2016.

Dependent Variable: CONS
Method: Least Squares
Date: 12/12/17 Time: 01:23
Sample (adjusted): 2 48
Included observations: 47 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-92.1841	57.3517	-1.607348	0.1151
DI	0.213890	0.070617	3.028892	0.0041
CONS (-1)	0.667240	0.061362	10.87389	0.0000

R-squared	0.988216	Mean dependent var	16691.28
Adjusted R-squared	0.988134	S.D. dependent var	5205.873
S.E. of regression	220.8604	Akaike info criterion	13.73045
Sum squared resid	218.4539	Schwarz criterion	13.84854
Log likelihood	-319.6656	Hannan-Quinn criter.	13.77489
F-statistic	12306.99	Durbin-Watson stat	0.961921
Prob(F-statistic)	0.000000		

(i) What is the short-run marginal propensity to consume (MPC)? Interpret it. (4 marks)

(ii) What is the long-run MPC? Interpret it. (6 marks)

(iii) Write down the short-run consumption function. (3 marks)

(iv) Write down the long-run consumption function. (6 marks)

[Total: 25 marks]

QUESTION 3

(a) Distinguish between:

(i) White noise and random walk. (5 marks)

(ii) Cointegration and spurious regression. (5 marks)

Continued...

(b) Given a total of 72 quarterly observations, which covers the period from 1999 Q1 to 2016 Q4, on M2 money supply and GNP, consider the following simple model:

$$LM2_t = -10.3571 + 2.5975LGNP_t \qquad (1)$$
$$t \quad = (-10.9422) \quad (28.8865)$$

R-squared = 0.9253 Durbin-Watson d = 0.2155

Where $LM2$ = M2 money supply (in logarithmic form)
$LGNP$ = gross national product (in logarithmic form)

(i) Evaluate the regression (1). (3 marks)

(ii) The Augmented Dickey-Fuller tests with a constant and a trend are shown below:

$$\Delta L\hat{M}2_t = -0.079LM2_{t-1} + 0.0084 + 0.052t + 0.7430\Delta LM2_{t-1}$$
$$\tau \quad = (-1.893) \quad (3.945) \quad (3.744) \quad (10.326)$$

$$\Delta L\hat{G}NP_t = -0.175LGNP_{t-1} + 0.0363 + 0.002t + 0.2851\Delta LGNP_{t-1}$$
$$\tau \quad = (-1.220) \quad (5.516) \quad (2.275) \quad (2.980)$$

At α = 5%, test the hypotheses whether there are unit roots in these two time series above? (8 marks)

(iii) Based on the Engle-Granger procedure, when we performed a unit root test on the residuals obtained from the regression (1), we attained the following result:

$$\Delta\hat{u}_t = -0.181\hat{u}_{t-1}$$
$$\tau \quad = (-2.333)$$

Are the variables of $LM2$ and $LGNP$ cointegrated or spuriously related at α = 5%? Explain. (4 marks)

[Total: 25 marks]

Continued...

QUESTION 4

(a) Suppose that given the data on log CPI (Consumer Price Index), you want to fit a suitable ARIMA model for a short-term forecast on these data. Outline the **FOUR (4)** steps involved in carrying out this task. (12 marks)

(b) Interpret the meaning of ARIMA (3, 1, 2). (3 marks)

(c) The following ARCH models are based on the CPI (Consumer Price Index) data for Country XYZ from January 1961 to February 2014, for a total of 649 monthly observations.

ARCH (1) Model:
$$\hat{\hat{u}}_t^2 = 0.000088 + 0.3839\hat{u}_{t-1}^2$$
$$t = (7.684) \quad (12.235)$$
$$R^2 = 0.1397 \qquad d = 1.969$$

ARCH (2) Model:
$$\hat{\hat{u}}_t^2 = 0.000038 + 0.1412\hat{u}_{t-1}^2 + 0.0971\hat{u}_{t-2}^2$$
$$t = (6.42) \quad (3.37) \quad (3.01)$$
$$R^2 = 0.2153 \qquad d = 2.0114$$

How would you choose between the two models at α = 5%? Show the necessary calculations by using F test. (10 marks)

[Total: 25 marks]

End of Questions

Formula

$$F = \frac{(R_{UR}^2 - R_R^2)/m}{(1 - R_{UR}^2)/(n-k)};$$

n = number of observations; m = number of linear restrictions; k = number of parameters in the unrestricted (UR) regression

Statistical Tables

Appendix A: t-Table

two tails	0.2	0.1	0.05	0.02	0.01
One tail	0.1	0.05	0.025	0.01	0.005
df					
10	1.37	1.81	2.23	2.76	3.17
20	1.33	1.72	2.09	2.53	2.84
30	1.31	1.70	2.04	2.46	2.75
40	1.30	1.68	2.02	2.42	2.70
50	1.30	1.68	2.01	2.40	2.68
60	1.30	1.67	2.00	2.39	2.66
75	1.29	1.67	1.99	2.38	2.64
100	1.29	1.66	1.98	2.36	2.63
120	1.29	1.66	1.98	2.36	2.62

Appendix B: F-table (α=0.05)

df2\df1	1	2	3	4	5	6	7	8
10	4.96	4.10	3.71	3.48	3.33	3.22	3.14	3.07
20	4.35	3.49	3.10	2.87	2.71	2.60	2.51	2.45
30	4.17	3.32	2.92	2.69	2.53	2.42	2.33	2.27
40	4.08	3.23	2.84	2.61	2.45	2.34	2.25	2.18
50	4.03	3.18	2.79	2.56	2.40	2.29	2.20	2.13
60	4.00	3.15	2.76	2.53	2.37	2.25	2.17	2.10
70	3.98	3.13	2.74	2.50	2.35	2.23	2.14	2.07
80	3.96	3.11	2.72	2.49	2.33	2.21	2.13	2.06
100	3.94	3.09	2.7	2.46	2.31	2.19	2.10	2.03
200	3.89	3.04	2.65	2.42	2.26	2.14	2.06	1.98
500	3.86	3.01	2.62	2.39	2.23	2.12	2.03	1.96
1000	3.85	3.00	2.61	2.38	2.22	2.11	2.02	1.95

Appendix C

TABLE D.7 1% and 5% Critical Dickey–Fuller t (= τ) and F Values for Unit Root Tests

Sample Size	t_{nc}*		t_c*		t_{ct}*		F†		F‡	
	1%	5%	1%	5%	1%	5%	1%	5%	1%	5%
25	−2.66	−1.95	−3.75	−3.00	−4.38	−3.60	10.61	7.24	8.21	5.68
50	−2.62	−1.95	−3.58	−2.93	−4.15	−3.50	9.31	6.73	7.02	5.13
100	−2.60	−1.95	−3.51	−2.89	−4.04	−3.45	8.73	6.49	6.50	4.88
250	−2.58	−1.95	−3.46	−2.88	−3.99	−3.43	8.43	6.34	6.22	4.75
500	−2.58	−1.95	−3.44	−2.87	−3.98	−3.42	8.34	6.30	6.15	4.71
∞	−2.58	−1.95	−3.43	−2.86	−3.96	−3.41	8.27	6.25	6.09	4.68

*Subscripts nc, c, and ct denote, respectively, that there is no constant, a constant, and a constant and trend term in the regression Eq. (21.9.5).

†The critical F values are for the joint hypothesis that the constant and δ terms in Eq. (21.9.5) are simultaneously equal to zero.

‡The critical F values are for the joint hypothesis that the constant, trend, and δ terms in Eq. (21.9.5) are simultaneously equal to zero.

Source: Adapted from W. A. Fuller, *Introduction to Statistical Time Series*, John Wiley & Sons, New York, 1976, p. 373 (for the τ test), and D. A. Dickey and W. A. Fuller, "Likelihood Ratio Statistics for Autoregressive Time Series with a Unit Root," *Econometrica*, vol. 49, 1981, p. 1063.

End of Paper